



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,238	10/31/2003	Elbert E. Huang	YOR920030304US2 (16973)	3354
23389	7590	02/10/2006	EXAMINER	
SCULLY SCOTT MURPHY & PRESSER, PC 400 GARDEN CITY PLAZA SUITE 300 GARDEN CITY, NY 11530			BOOTH, RICHARD A	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/699,238

Applicant(s)

HUANG ET AL.

Examiner

Richard A. Booth

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 17-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 8, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Forester, US 2002/0172898.

Forester shows the invention as claimed including an interconnect structure comprising: a buried etch stop layer 320 comprised of a polymeric material having the claimed composition; a via level interlayer dielectric 310 that is directly below said buried etch stop layer; a line level interlayer dielectric (330 or 340) that is directly above said buried etch stop layer; conducting metal features 335 that traverse through said via level interlayer dielectric, said line level interlayer dielectric, and said buried etch stop layer (see fig. 3 and paragraphs 0020-0033).

With respect to claim 2, the etch stop material can be a polysilazane (see paragraph 0032).

Concerning claim 8, the buried etch stop layer and via level interlayer dielectric have an identical pattern.

Art Unit: 2812

Regarding claim 15, the conducting metal feature is copper.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-6 and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forester, US 2002/0172898.

Forester is applied as above but does not expressly disclose wherein said buried etch stop layer is one of the claimed materials, the dielectric constant of the etch stop layer, the porosity of the etch stop layer, other characteristics of the etch stop layer, and the thicknesses of layers.

With respect to the specific etch stop material, the examiner takes official notice that it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the etch stop of a polysilazane such as polyureamethylvinylsilazane because this is a well known polysilazane material.

Concerning the dielectric constant, porosity, and other characteristics of the etch stop layer, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum characteristics of the etch stop layer based upon a variety of factors

Art Unit: 2812

and such limitations would not lend patentability to the instant application absent a showing of unexpected results.

Regarding claims 11-12, note that it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the via level and line level interlayer dielectrics of either the same or different materials based upon a variety of factors including the desired properties of each particular layer and such limitation would not lend patentability to the instant application absent a showing of unexpected results.

With respect to claims 13-14, the particular thickness of the buried etch stop layer and via and line level interlayer dielectric would be optimized during routine experimentation based upon a variety of factors including the desired scaling factor of the device and such limitation would not lend patentability to the instant application absent a showing of unexpected results.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Forester, US 2002/0172898 in view of Cohen, US 2005/0124153.

Forester et al. is applied as above but do not expressly disclose wherein adhesion promoters are positioned on an interface of said buried etch stop layer.

Cohen discloses an adhesion layer 18 formed so as to cover exposed inner surfaces of a via (see fig. 1 and paragraph 0025). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Forester et al. so as to

Art Unit: 2812

include an adhesion layer because this will allow for the adhesion of subsequently formed metallization layers.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Forester, US 2002/0172898 in view of Lopatin et al., U.S. Patent 6,893,955.

Forester is applied as above but does not expressly disclose the conducting metal features having a lining comprising a metal containing barrier layer such as tantalum. Lopatin et al. discloses a barrier layer 232 can be composed of tantalum (see col. 5-lines 57-63). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Forester so as to include the tantalum barrier layer of Lopatin et al. because such a barrier layer would provide adequate protection for the metal feature.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

### ***Terminal Disclaimer***

The terminal disclaimer filed on 11/23/05 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 6,803,660 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Art Unit: 2812

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard A. Booth  
Primary Examiner  
Art Unit 2812

February 4, 2006